

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

**In Re Public Notice
Regarding Issues Related to
Commission's Wireless Broadband
Policies**

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GN Docket No. 04-163

COMMENTS OF PEGASUS RURAL BROADBAND

Pegasus Rural Broadband (PRB) files these comments in response to the Commission's Public Notice regarding the deployment of wireless broadband services. PRB believes that it can be most helpful to the Commission by describing its business, its early success and the challenges we foresee. As this proceeding unfolds, we intend to provide more specific recommendations about what the FCC and other regulators can do to disperse the benefits of wireless broadband more broadly, especially in rural America, around which PRB's service plan revolves. In general, we observe that the Commission and its officials have made positive statements about spectrum flexibility. We believe that acting on such statements, and instituting maximum flexibility, subject to non-interference with other authorized users, in both licensed and unlicensed bands (though our focus here is on unlicensed bands) will unleash entrepreneurship and ignite the market for wireless broadband deployment.

Below, we respond to each of the questions put forth in the Commission's notice to which we have relevant information and views. We reserve the opportunity of supplementing these responses later as the record develops.

About Pegasus Rural Broadband

PRB is a fixed wireless operator providing residential and commercial broadband service via unlicensed spectrum to 20 rural communities in Texas, and bringing more communities online on a daily basis. PRB is a subsidiary of Pegasus Communications Corporation (see below), and is unaffected by the recent Chapter 11 filing of other subsidiaries of our common parent corporation, Pegasus Communications Corporation (NASDAQ: PGTV), referred to herein as “Pegasus Communications” or “Pegasus”.

PRB’s determination and commitment to expand service to rural communities is both current and longstanding. In February of 2003, PRB filed an application with the Rural Utilities Service’s Broadband Access Loan Program. That application requested \$13 million dollars to build an unlicensed fixed wireless network that would serve 94 rural Texas communities. In February of 2004, that application was approved.

PRB is currently providing affordable broadband and ISP services in the following Texas communities: Brownwood, Lake Brownwood, Bangs, Early, Coleman, Ballinger, Winters, Albany, Breckenridge, Graham, Jacksboro, Bowie, Sweetwater, Abernathy, Owens, Cisco, Eastland, Littlefield, Seminole, Denver City and Lorenzo. We are adding new communities on a daily basis, and we expect to have the entire 94-community network built out within a year.

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The name of our service is WiBAND and it is available to customers in a number of packages. Our most popular is our Basic Residential Package, which offers the customer a 200 kilobits per second symmetric connection and email for \$29.95 a month. We have a “premium” offering which gives the customer a download speed of 768 kilobits per second for \$49.95 per month. PRB provides a professional installation service, and the upfront cost varies from \$99 to \$0 depending on whether the customer makes a one, two or three year commitment.

PRB uses equipment from several different manufacturers, including Alvarion, Motorola and Orthogon. We use the 900MHz, 2.4GHz and 5GHz bands.

All the comments that follow should be understood as a viewpoint from the perspective of a rural service provider using unlicensed bands. Although Pegasus Communications, PRB’s parent, has several licensed frequencies, including MMDS, PRB uses only unlicensed bands. Likewise, PRB serves no city which is in a Metropolitan Statistical Area and which is over 20,000 people.

About Pegasus Communications: The Quality Choice in Rural America

PRB’s rural wireless service plan is consistent and of a piece with our parent company’s longstanding focus on service to rural America. Pegasus Communications is the only company focused exclusively on delivering affordable, high-quality TV and Internet services to America’s rural and under-served areas

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Pegasus, founded in 1991, has its roots firmly planted in rural America. In 1993, Pegasus furthered this commitment by purchasing three broadcast TV stations in small markets.

Presently the company operates ten TV stations in small and medium-sized markets.

In 1994, Pegasus was one of the first companies to enter the satellite TV business by investing in the launch of DIRECTV and gaining exclusive rights to provide the service throughout much of rural America. Today, Pegasus Satellite Television is the nation's largest independent provider of DIRECTV, serving approximately 1.2 million households in 41 states. That service is provided through one of the most extensive retailer networks in rural America, comprised of more than 3,000 independent equipment dealers across the nation. We also offer the support of more than 1,000 U.S.-based customer care representatives, available seven days a week.

Pegasus is also a pioneer in delivering high-speed Internet service to rural communities.

In our most recent initiative in April 2003, Pegasus Rural Broadband started offering reliable, affordable high-speed Internet access in rural Texas, with plans to expand nationwide.

Today, Pegasus has more than 1,400 employees, annual revenues of more than \$800 million, and shares that are traded publicly on the NASDAQ Exchange.

RESPONSES TO THE COMMISSION'S QUESTIONS

1. To what extent are both licensed and unlicensed wireless broadband networks providing an alternative facilities-based platform to other broadband services, including cable and DSL? To what extent have wireless broadband service providers increased broadband access and competition in rural and underserved areas? If so, are regulatory changes needed to promote or advance these trends?

In practically every one of the more than twenty communities where we have launched service, there has been at least one, if not several, unlicensed wireless Internet providers (WISPs). So far, we have not encountered any licensed WISPs in these communities.

Even in the few communities that have DSL or cable broadband available, fixed wireless still provides service to the many people who live outside the coverage area of these services.

The prices of fixed wireless services vary widely from provider to provider. We have seen providers charging \$800 upfront and \$70 a month for 128k service. At the other end is our basic WiBAND residential service, which has \$0 upfront costs (with a 3 year commitment) and costs \$29.95 a month for 200 kilobits per second.

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Thus, fixed wireless providers are everywhere, and in many rural communities they are the only affordable broadband option available. Of course, there is always satellite Internet access, but the high upfront and recurring costs of these services, coupled with their high latency and extreme asymmetry make currently available satellite broadband services impractical to the majority of users.

Likewise, multiple unlicensed WISPs promote healthy competition in even the smallest rural communities. In one community of 5,000 people, the only broadband option was an unlicensed WISP that charged \$800 upfront and over \$100 monthly for 256k service. We initiated WiBAND in that community, and within days the incumbent had dropped prices to exactly match our offering. Such price and service competition benefits consumers, sharpens entrepreneurship and works toward the Commission's goals of broader deployment.

Thus, there is already robust competition going on in many parts of rural America. As for what will continue to advance and promote these trends, we will discuss that in greater detail in each of the questions below. But to summarize, the three greatest challenges facing the wireless industry today are

1. The scarcity of spectrum, especially in the sub-1GHz band
2. The high cost of CPE
3. The industry itself – fragmented, marginal, chaotic

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2. Does the Commission currently provide sufficient spectrum suitable for wireless broadband networks? Is the relative availability of spectrum for licensed services or unlicensed devices appropriate? If not, how so?

PRB uses all of the most popular unlicensed bands – 900MHz, 2.4GHz and 5.xGHz. Like most providers, we use the spectrum for two purposes: backhauls and coverage.

Backhauls are the point-to-point, high bandwidth links between towers. *Coverage* is the point-to-multipoint connections between the tower and the customer.

Like every other WISP we know, PRB uses the 5GHz band for backhauls. Because the signal travels between towers, well above the trees, the 5GHz band's primary weakness – sensitivity to Line-of-Site ("LOS") problems – is not relevant. That leaves behind only 5GHz's good points – plenty of spectrum and high bandwidth.

On several occasions PRB has had to coordinate with other providers in the 5GHz range, and in each case there has been enough spectrum available so as to eliminate the interference. Therefore, we do not see a pressing issue with backhauls and the 5GHz band in rural America.

Coverage, on the other hand, and the spectrum available for it is the single most pressing matter in the WISP world. Making additional spectrum, especially in the sub-1GHz range, would address four key problems faced by WISPs today:

1. Congestion of the existing bands
2. Small coverage areas
3. Line of Site (“LOS”) issues and the prevalence of “dry hole” truck rolls (i.e., sending out an installer, only to find that the premises cannot be served), and
4. Inability of unlicensed WISPS to match the bandwidth offerings of DSL and cable

Congestion of the Existing Unlicensed Bands. When PRB started offering WiBAND in Texas in the spring of 2003, we were using the 2.4GHz band for our coverage. We immediately ran into significant congestion on that band from operators both legitimate and illegitimate. By illegitimate, we mean those who take 802.11b gear and illegally boost it beyond the FCC’s rules with amplifiers.

We are not alone. The message boards and journals of the WISP industry are abuzz with discussions about congestion and non-compliant operators. Our view is that the issue of non-compliant operators will have to be dealt with at some point, but even if all the non-compliant operators were shut down or forced into compliance, there would still be significant congestion the unlicensed bands. More spectrums would go a great way towards alleviating this crowding.

Small Coverage Areas. “Coverage area” is a very fluid term. Our experience in the field is that the “90%” zone is within 4 miles of the tower. This means that we feel 90% confident that we can serve anyone within that radius. Outside of that radius, the install

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costs start to climb because of the rising probability of no signal due to Line of Site (see next point).

We mention this to make a distinction between what manufacturers claim (which is maximum, clear Line of Site distance) and what is economically practical in the field. To be sure, there are people who can hit our towers from 12 miles away like the vendors say - but we will never know who they are because there is no way we could justify the cost of sending a site survey crew out 12 miles for the 1 in 20 possibility that that customer may get signal.

“Small coverage area” might seem like a facile complaint. Every carrier would like to have a larger coverage area. But by almost any measure, 4 miles is a small radius, *especially* when dealing with rural America. “Rural” is also a pliant term. A town of 20,000 people is rural, *but* an even greater step forward is when towns even smaller than that – say, 2,000 people get broadband. It would be a real triumph if the people who live in smaller communities, and even those who live in no community at all could get the same access. This will never happen as long as the 90% zone is limited to 4 miles.

The typical rural American county is a square 30 miles on a side with the county seat more or less in the middle. Therefore, a system with a 90% assurance radius of 22 miles would allow coverage of the entire county with a single antenna from the county seat. This would be comparable to the 35 mile radius currently in place MMDS/ITFS and move the country much closer to the policy goal of ubiquitous affordable coverage.

Line of Site/Dry Holes. All the unlicensed frequencies are susceptible to line of site issues to a greater or lesser degree, which gives each of the bands its own distinct personality.

Starting at the top of the relevant spectrum, 5GHz is the most susceptible to LOS problems: no matter how close to the transmitter you are, without LOS to the transmitting antenna, there will be no signal. This in turn leads to a lot of “dry holes” –a crew arrives to do an installation, but cannot get signal at the customer’s location. *This is a huge expense burden on the WISP.* Sending a crew out costs anywhere from \$100 – 200 depending on many factors: local pay scales, distance to customer, cost of gas, etc. Signing up the customer starts to recoup that cost, but if it’s a dry hole, then there is no recovery. That is why we only offer 5GHz to businesses who typically don’t have as many trees around their building, and who are willing to purchase higher end packages.

2.4GHz, the classic unlicensed band, is actually the quirkiest and most unpredictable of the bands to work with. Sometimes there is no signal when the tower is in clear site, because the Line of Site is passing right over a competitor’s transmitter or a neighbor’s hotspot. Sometimes there is signal when there’s a wall of trees in clear sight. Again, there are plenty of dry hole truck rolls, also eroding profitability.

900MHz is the least susceptible to LOS issues, which is why PRB switched from 2.4GHz to 900MHz soon after we started offering our service-- even though there is only 26MHz

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available in the 900MHz band versus the 100MHz in 2.4GHz and 250MHz in 5GHz.

With 900MHz you can draw a circle around the tower and be 90% assured that those customers would get signal regardless of obstructions or foliage.

Nevertheless, 900MHz is a small slice of spectrum that will become increasingly crowded as WISPs discover its attractive properties and the prices for 900MHz gear come down.

Inability of unlicensed WISPs to match the bandwidth offerings of DSL and cable with their current spectrum allotments. DSL and cable modem providers are now routinely offering 1, 2 and 3 megabits per second service, whereas a lot of wireless gear tops out at between 1 and 2 megabits. There is unlicensed gear available that offers higher throughputs, mainly through the use of OFDM technology, but it is prohibitively priced. By the time it comes down to a reasonable price, cable and DSL will be up to 10 meg services. If WISPs are going to keep pace with DSL and cable modem, and not go broke buying CPE to do so, then we will need larger chunks of spectrum.

3. Do the services offered using unlicensed devices and those using licensed networks complement each other? If so, how?

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At this moment, PRB is not mixing unlicensed and licensed bands in providing service via our network, so we are not in a position to comment helpfully on this question.

4. There are several different regulatory approaches that determine access to the spectrum for wireless broadband service providers. Service providers using networks composed of unlicensed devices do not pay for access to the spectrum, but must not cause interference and must share the spectrum with other operators of unlicensed devices, whereas access to other spectrum is obtained through licensing after successful bidding at auction. In addition, some spectrum has been made available on a first come, first served basis. Has the method for access to spectrum affected the development of wireless technologies and the provisioning of wireless broadband services? If so, how?

By removing the large, fixed, upfront cost of spectrum with the unlicensed frequencies, the FCC created a very powerful force, a dynamic, that motivated an army of entrepreneurs to start bringing affordable broadband services to many rural American communities that were nowhere on the deployment lists of the RBOCs and cable companies. That's the good news.

The bad news is that that dynamic did not switch off after the first provider lit up a particular town – or the second provider, or the third. Successive waves of providers slice an already small pie into many more slices, forcing all into a “race to the bottom” –

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getting the maximum coverage/customers for the least amount of money. The easiest way to win this race is to hook a bigger amplifier to your already non-compliant Wi-Fi hub and simply drown out your competitors in a storm of electromagnetic radiation. Of course, your competitor will respond in kind, with the net effect being a Hobbesian war of all against all, with everyone, especially the customer, coming out the loser.

As we will discuss below under the question about state-of-the-art technologies, the probable future for the unlicensed fixed wireless industry is one where a few large companies will emerge or (more likely) enter from other industries and consolidate the industry through a mixture of buyouts, crowd-outs and, in the case of diehard Wi-Fi hotrodders, litigation. In this future, these companies will become the de facto law since they will pick up important the task that the FCC does not want – compliance enforcement.

The only caveat is that once a billyclub is handed to someone, it's hard to get it back. As we have seen with the RBOCs over the past years, an oligopoly is very effective at keeping competition out, even in the face of determined competition backed by the will of the Federal government. If the Commission is uneasy with the idea of incumbents making the determination on who, if anyone, gets to compete, then they will need to revisit their radically hands-off policy when it comes to enforcing the power limits in the unlicensed bands. We fully understand the commission's reluctance to get entangled in "coordination" and enforcement. However, we think there are a number of steps that

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could be taken which would alleviate some of the chaos in the unlicensed bands without necessarily turning the FCC into a policeman.

5. Wireless broadband offers clear advantages over other broadband alternatives in terms of both portability and mobility. Do the Commission's rules effectively provide for or account for these capabilities? Could these rules be more flexible? If so, how?

PRB has focused almost exclusively on fixed access in customers' premises, so we are not in a position to comment helpfully on this question.

6. Are there regulatory incentives that would foster continued investment in and deployment of state-of-the-art technologies? If so, what are they? Are the incentives different for licensed services as compared with services offered using unlicensed devices?

As discussed above, the nature of the unlicensed bands has created a very fragmented industry in which no provider has more than several thousand customers. These small operators place small (and therefore high-priced) orders with small vendors to satisfy a small number of customers. There is no "virtuous circle" of bulk purchases leading to

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discounts leading to cheaper install costs leading to lower prices leading to more customers leading to bigger bulk purchases, and so on.

So how did the business ever get off its feet? By piggybacking on another industry's economies of scale. The real hero of the unlicensed bands is not the WISP industry, but the PC industry, which saw Local Area Networking as part of its responsibility in satisfying customer needs and demand, and thus took up the banner of Wi-Fi. In contrast to the WISP industry, the PC industry is relatively united around the Wintel suite of standards, with millions of users spurred the Linksys' and Lucent's of the world to take 802.11b gear that cost hundreds of dollars and bring the cost down to the point where the chips are just added to the motherboard as a matter of course. The WISP pioneers borrowed this technology from the PC world because they could not get it from the existing fixed wireless vendors.

Cheap CPE will occur when someone is willing to write multi-million dollar orders to the vendors. That will only happen when the purchaser is assured that their investment is not going to be negated by some local computer enthusiast equipped with nothing more than a Linksys hub, a Radio Shack amplifier, a Pringles can and a healthy disregard for the rules of the FCC.

That will occur in either one of two ways. Either large companies with the necessary resources will enter the market and steamroll flat all the non-compliant and marginal operators, or the industry along with the commission will agree on some basic

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mechanisms for identifying non-compliant operators and bringing them into compliance or out of the market. The first is already beginning to happen.

7. We seek comment on the extent and nature of the deployment of wireless broadband services. For example, we are interested in data regarding market penetration rates; the geographic distribution of wireless broadband services; the extent of competition in the areas in which wireless broadband is deployed; and whether licensed services, unlicensed devices, or a combination of both licensed service and unlicensed devices are used; and the types of technologies used in the networks deployed.

Penetration. PRB's highest penetration rate is 7% in one community after one year of service. We do not know our competitors' penetration rates, although most WISPs typically have between 100 and 500 customers. The 10 largest WISPs in America in 2004, according to Broadband Wireless Exchange (www.bbwexchange.com/top10wisps.asp) have between 800 and 7,000 customers.

Geographic Distribution. In every one of our served communities there is at least one, if not several, incumbent wireless providers.

Competition. Most of the competition in these communities is between competing WISPs. In one community there is DSL and in one of the communities there is cable

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modem. However, in these rural communities (between 2,000 and 20,000 people), cable modem and DSL deployments are typically limited in scope.

Licensed & Unlicensed. We have encountered no operators using licensed frequencies.

The vast majority are using 2.4GHz for coverage and 2.4/5GHz for backhauls. PRB uses 900MHz for most of our coverage. We have so far not met anyone in our served communities using 900MHz.

Equipment. The majority of the unlicensed WISPs are using modified 802.11b “Wi-Fi”, often way out of compliance with FCC power limits. We’ve seen a few using Motorola’s Canopy line and a few using Alvarion.

8. With the continued development of new technologies and network configurations, including mesh networks and integrated wireless broadband networks and devices that use both licensed and unlicensed spectrum, are there any rules that require review for updating or increased flexibility?

We have had very limited contact with these technologies, so we are unable to comment helpfully at this time.

9. We also seek comment on the types of applications associated with wireless broadband deployment.

a. What types of applications are or will be offered over wireless broadband networks? Are they similar to the applications of the wired Internet (email and web surfing), or are other, more personalized, niche applications being developed? Do the applications differ between licensed and unlicensed networks? What is the relationship between network operators and content providers?

PRB has focused on providing a fixed connection to the home or business. PRB has *not* focused on nomadic, portable or mobile applications at this point. Therefore, PRB's experience has been that the applications used on WiBAND are the same as wired networks: browsing, file sharing, email, VOIP. As mentioned above, PRB has no licensed-frequency operations, so we cannot speak to whether or how the applications for unlicensed and licensed differ. As for content, PRB is at the beginning of its journey, so our primary focus is providing an affordable, reliable connection to the home, and not on content.

b. What are typically available data rates, and at what pace are they increasing?

The data rates we have send for unlicensed WISPs typically run between 128 kilobits per second and 1.5 megabits per second. Higher data rates are available, but they tend to custom installations, and not part of the routine offering. PRB's published offerings come in 200 and 768 kilobits per second flavors.

As mentioned above, the big challenge for the WISP industry is how to keep up with DSL and cable's multi-megabit offerings given the spectrum allocated in the unlicensed

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bands. Our current transmitters top out at 2 megabits per second, making it very difficult to offer a 1- or 2-megabit consumer service.

c. Is the traffic associated with wireless broadband more typically symmetric or asymmetric? Does the relative distribution of these traffic patterns affect the required bandwidth for wireless broadband systems? If so, how?

As with wired broadband, wireless broadband tends to be very asymmetric, with a much heavier download requirement.

d. What is the distribution of wireless broadband between fixed, mobile, and portable installations?

At this point in time, PRB's primary focus is providing fixed broadband access to homes and businesses. 90% of our installations are fixed, with the remaining 10% portable.

10. While we are interested in these deployment data across larger geographic regions and on an aggregate basis, we are also interested in information about wireless broadband deployment in specific communities -- rural or urban, large or small, and in varied geographic regions. With a view toward using successful deployments as models or examples for other service providers or communities, have there been pilot or full-scale programs that have been particularly innovative or successful in terms of increasing access to broadband through wireless facilities?

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Not that we know of. All of the wireless implementations we have seen have been remarkable only in their similarity, and ours is no exception. The AOL's and Verizon DSL's of this world have hammered out a model for providing customers broadband connectivity and services, and all the operators we have seen seem comfortable to follow in that model.

11. Are there ways in which federal wireless broadband policies could facilitate better available policy options for states and municipalities? If so, how?

We intend to offer specific recommendations as the record develops. In general, we believe that the FCC should move forward with its several proposals to liberalize spectrum flexibility. This recommendation applies with respect to both licensed spectrum, where the FCC has exhibited great flexibility, and to licensed spectrum, where the FCC is considering allowing broadcast spectrum for broadband, among other proposals. We will supply more specific and detailed recommendations at another time.

12. What barriers (information, infrastructure) to entry remain for WISP entrepreneurs particularly for unlicensed services? To the extent identified, how can government address these issues?

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As discussed above, the greatest challenges facing the WISP industry are 1) CPE cost, 2) available spectrum and 3) the extreme fragmentation of the industry.

The FCC can best address these problems by 1) allocating additional spectrum for unlicensed use, especially in the sub-1GHz range and 2) promoting steps to bring more operators into compliance with the Commission's existing rules for the spectrum.

Respectfully submitted

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